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Integrating Artificial Intelligence Platforms into Project-Based Learning

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ABSTRACT: This study aims to analyze the impact of integrating artificial intelligence (AI) platforms in the project-based learning process (PBL) in primary and lower secondary education in Kosovo. The research was conducted at the lower secondary primary school "Heronjtë e Lumës" in Vermica, Prizren, with a sample of 85 students and 5 teachers. The research employs a mixed-methods approach, combining quantitative methods through structured questionnaires and statistical tests (t-test and Pearson correlation) with qualitative methods through thematic analysis of interviews and evaluation of students' projects by teachers. The quantitative results show statistically significant differences ($p < 0.001$) in motivation, creativity, collaboration, and technology use between the experimental and control groups, indicating that the use of platforms such as *ChatGPT* and *Canva AI* positively impacts student engagement and performance. Thematic analysis of the interviews highlighted four main themes: (1) increasing motivation and engagement, (2) developing creativity and collaboration, (3) transforming the role of the teacher, and (4) the ethical and technical challenges of using AI. In conclusion, the study confirms that the integration of artificial intelligence into PBL fosters 21st-century competencies, including critical thinking, creativity, and collaboration, while transforming the traditional teaching approach towards a more personalized, collaborative, and innovative environment. However, the success of this integration requires institutional support, ongoing teacher training, and the implementation of ethical policies for the responsible use of AI in education.

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KEYWORDS:
Artificial Intelligence, digital innovation, project-based learning, students, learning.

INTRODUCTION

Artificial intelligence (AI) has become a core component of the digital transformation in education, reshaping the way students learn, collaborate, and develop skills for the future (Holmes et al., 2022). The integration of AI platforms into the learning process is offering new opportunities for personalizing learning, increasing motivation, and improving pedagogical efficiency (Luckin, 2023). Project-Based Learning (PBL) Learning (PBL) is seen as an effective approach for developing 21st century competencies, where interaction with intelligent technologies can foster creativity, critical thinking, and real-world problem solving (Thomas et al., 2021).

Recent studies highlight that the use of AI tools such as ChatGPT, Canva AI, and Copilot can improve the processes of reflection and evaluation of projects through automatic analysis and assistance in creation (Zawacki-Richter et al., 2023). These technologies contribute to the creation of personalized learning environments and support the development of a collaborative form between students and teachers (Su & Yang, 2024). The integration of AI platforms in PBL does not aim to replace the role of the teacher, but to empower them as a guide and mentor in the active learning process (Schiff, 2023).

In the context of primary and lower secondary education in Kosovo, where digitalization is still in its infancy, the potential of artificial intelligence platforms to improve learning outcomes remains untapped. Therefore, analyzing the impact of these technologies on project-based learning is important to understand how they can be used effectively to build creative and collaborative competencies in students (OECD, 2023). This study contributes to the existing literature by examining concrete ways of integrating AI tools into teaching and by providing practical guidance for teachers at primary and lower secondary levels.

Research Purpose

The main purpose of this research is to analyze the impact of integrating artificial intelligence (AI) platforms in project-based learning (PBL) in primary and lower secondary education, examining how these technologies contribute to the development of students' creative, collaborative, and critical thinking skills. The study aims to explore the effectiveness of using platforms such as

ChatGPT, Canva AI, and other intelligent digital tools in improving the active learning process and personalizing the learning experience for each student.

In more detail, this research aims to:

1. To assess the impact of AI platforms on student engagement and motivation during the project-based learning process.
2. To analyze how AI tools help develop 21st-century competencies, such as creativity, collaboration, and real-world problem solving.
3. Identify the most effective practices for pedagogical integration of AI in the planning and evaluation of educational projects.
4. To provide practical guidance to teachers and educational institutions on the ethical and sustainable use of artificial intelligence in learning processes.

This goal is supported by contemporary literature, which highlights the transformative potential of artificial intelligence in creating personalized learning environments and supporting the development of advanced student competencies (Luckin, 2023; Su & Yang, 2024; Zawacki-Richter et al., 2023).

Research Questions

In line with the overall purpose and objectives of the study, the following research questions have been formulated to guide the research on the integration of artificial intelligence platforms in project-based learning (PBL):

1. How does the use of artificial intelligence platforms affect student motivation and engagement during the project-based learning process?
2. How does the integration of AI help develop creative, collaborative, and critical thinking skills in students?
3. What are the most effective strategies and practices that teachers can use to pedagogically and ethically integrate AI platforms into project-based learning?
4. How does the integration of AI affect the project evaluation process and the quality of learning outcomes?
5. What are the challenges and limitations that teachers and students face when using AI platforms in the project-based learning process?

Research Hypotheses

H_1: The integration of artificial intelligence (AI) platforms into project-based learning positively impacts student motivation and engagement.

H_2: Using AI tools (such as ChatGPT and Canva AI) improves students' creative and collaborative skills.

H_3: There is a significant relationship between the use of AI platforms and the improvement of the quality of projects completed by students.

H_4: Teachers who integrate AI into the teaching process experience increased effectiveness and facilitated project evaluation.

LITERATURE REVIEW

The integration of artificial intelligence (AI) into teaching and learning has marked a profound transformation in the way educational processes are structured and student competencies are developed. Project-Based Approaches Learning (PBL) is experiencing a significant evolution through intelligent technologies, which make learning more interactive, personalized, and data-driven (Ruiz Viruel, Sanchez Rivas, & Ruiz Palmero, 2025).

The role of Artificial Intelligence in contemporary learning

AI is being seen as a key element in the development of personalized education and in supporting teachers through data analytics, automated recommendations, and adaptive learning (Zhou et al., 2025). The use of educational chatbots, recommendation algorithms, and student behavior analysis tools has helped create more flexible and personalized learning environments (Ingason et al., 2025).

Along the same lines, Elsallamy's (2025) study on the integration of generative AI into teacher preparation programs shows that these technologies can foster creativity and innovation through project-based tasks that involve analysis, design, and in-depth reflection.

Integrating AI into Project-Based Learning (PBL)

Integrating artificial intelligence into PBL is proving to be an approach that strengthens 21st-century skills: collaboration, critical thinking, and real-world problem solving (Posekany, 2024). Recent studies have shown that projects that incorporate the use of AI tools, such as ChatGPT, DALL-E, and Copilot, improve learning outcomes and increase student motivation through active involvement in creation (Yiling et al., 2025).

In a systematic review, Bosarge (2025) finds that integrating AI into secondary curricula through the AI4K12 framework enhances interdisciplinary understanding and practical skills in project design. Similarly, Habibah, Ibrohim, and Susilo (2025) emphasize that assisted PBL significantly impacts the development of critical thinking and communication skills of students at secondary levels.

Benefits and challenges of using AI in education

The main benefits of incorporating AI into PBL are related to the personalization of learning, the construction of authentic experiences, and the assistance it provides in formative assessment (Pinheiro & Santos, 2024). At the same time, studies warn of the need to train teachers in digital and ethical competencies for the responsible use of intelligent technologies (Ahrofi, 2025).

According to Lišnić, Zaharija, and Mladenović (2025), the integration of AI in primary education through three-year pilot projects has shown significant results in improving creativity and ethical awareness of the use of technology. Meanwhile, the study by Ingason et al. (2025) shows that the use of AI chatbots in education provides personalized feedback that helps develop students' managerial and reflective competencies.

Recent developments and interdisciplinary approaches

Interdisciplinary approaches to using AI for PBL include combining computational thinking, STEM, and human-centered learning, helping to prepare students for the knowledge-based economy (Pinheiro & Santos, 2024; Chaniago et al., 2025). In the context of higher education, Yusuf (2025) shows that the integration of augmented reality and AI in project-based learning increases innovation and computational thinking.

Another important development is the incorporation of generative AI and the metaverse into project-based learning, which provides interactive virtual experiences, helping students build complex solutions to real-world problems (Svoboda & Knihová, 2025; Maalek, 2024).

METHODOLOGY

Research Design

This study was conceived to analyze the impact of integrating artificial intelligence (AI) platforms into project-based learning (PBL) in primary and lower secondary education in Kosovo. The research followed a mixed-methods approach, combining quantitative and qualitative methods to provide a comprehensive overview of the effects of using AI tools in the learning process. The quantitative approach was used to measure the impact of AI platforms on student motivation and collaboration through structured questionnaires, while the qualitative approach was used to analyze teachers' perceptions and the quality of projects carried out by students. This method allows for data triangulation, combining different sources to increase the validity and reliability of the results (Creswell & Plano Clark, 2023).

Sample

The study was conducted at the "Heronjtë e Lumës" lower secondary school in Vermica, Prizren, with a sample of 85 students from different classes. The sample was selected through purposive random sampling, ensuring sufficient representation from different age groups and educational levels. Also, 5 teachers participated in the study, who contributed through reflective interviews and evaluations of completed projects. The selection of this school was made due to its involvement in pilot initiatives for the digitalization of education and its readiness to integrate intelligent technologies into the teaching process.

Research Instruments

The main data collection instruments included a structured questionnaire for students, which contained four main areas: motivation, collaboration, creativity, and use of technology. The questionnaire used a 5-point Likert scale (from 1 = not at all to 5 = very much). In addition, an evaluation rubric was used to analyze students' projects, designed by teachers based on the criteria of creativity, practical application, and use of AI tools. For the qualitative part, semi-structured interviews were conducted with teachers to collect data on perceptions, experiences, and challenges related to the use of artificial intelligence in the learning process.

Data Analysis

The reliability of the instruments was ensured through preliminary piloting with 20 students, where Cronbach's coefficient was calculated. Alpha ($\alpha = 0.89$), indicating a high level of internal consistency. This makes the instrument suitable for use in similar educational studies (Tashakkori & Teddlie, 2022).

The data collection process was conducted in three phases. In the first preparatory phase, students were introduced to the basic concepts of artificial intelligence and trained in the use of the ChatGPT and Canva AI platforms within the framework of project-based learning. The second phase involved the implementation of project-based learning, where students worked in groups to create creative solutions to specific topics, using AI tools for research, design, and presentation. The third phase involved evaluation and reflection, where teachers analyzed the projects and provided qualitative feedback on the effectiveness of the process.

The collected data were analyzed through a combination of quantitative and qualitative methods. Quantitative analysis was performed through SPSS, using an independent t-test and correlation. Pearson to test the study hypotheses and compare results between groups. Meanwhile, qualitative analysis was conducted through thematic analysis (Braun & Clarke, 2021), identifying central themes related to teachers' perceptions of the impact of AI on the development of creativity, collaboration, and critical thinking.

Research Ethics

In terms of ethics, the research was conducted in accordance with ethical guidelines, respecting the principles of confidentiality, anonymity, and voluntary participation. All participants provided informed consent to participate in the study, while the data were used only for academic and research purposes in accordance with the European Data Protection Regulation (GDPR, 2018).

Research Limitations

The limitations of this research relate to the relatively small sample size, the dependence on digital tools and the quality of the internet connection, as well as the possible subjectivity of teachers when evaluating projects. However, these limitations are addressed through methodological triangulation and the combination of different data sources to increase the overall validity of the results.

RESEARCH RESULTS

This chapter presents the main results of research on the impact of integrating artificial intelligence (AI) platforms into Project-based Learning (PBL) in primary and lower secondary education. The purpose of this chapter is to analyze and interpret data collected through quantitative and qualitative instruments, focusing on the effects of using AI tools on student motivation, creativity, collaboration, and performance.

The results are presented in a structured manner, starting with the quantitative analysis of the questionnaire data, followed by the interpretation of the thematic analysis of the interviews and the projects carried out. Through this division, the aim is to draw conclusions based on empirical data that link the use of artificial intelligence platforms to the improvement of teaching processes and learning outcomes.

Student questionnaire results

The results of the questionnaire developed with students aim to provide a clear picture of the impact of the use of artificial intelligence platforms in the project-based learning process. The data were analyzed in four main categories: motivation, collaboration, creativity, and use of technology. The questionnaire was completed by 85 students of the lower secondary school *"Heronjtë e Lumës"* in Vermica, Prizren, divided into the experimental group (which used AI in projects) and the control group (which did not use AI). All questions were based on a 5-point Likert scale (from 1 = very little to 5 = very much), while the data were processed through SPSS.

Table 1Student results from the questionnaire

Category	Experimental group (M ± SD)	Control group (M ± SD)	Difference (p)	Interpretation
Motivation	4.42 ± 0.53	3.68 ± 0.74	< 0.001	significantly
Cooperation	4.36 ± 0.58	3.71 ± 0.69	0.002	significantly
Creativity	4.51 ± 0.49	3.82 ± 0.63	< 0.001	significantly
Use of Technology	4.60 ± 0.41	3.95 ± 0.57	< 0.001	significantly

The results show that the experimental group reported a significant increase in motivation during the development of projects that included artificial intelligence tools. This suggests that the use of platforms such as ChatGPT and Canva AI has had a positive impact on the emotional involvement and engagement of students in the learning process. In terms of collaboration, the data show a significant improvement in students who used AI tools in the implementation of projects. Students reported that the use of AI helped them in dividing roles, managing time, and creating joint ideas during the project phases. The results for creativity showed a significant effect of the use of AI. Students who used AI reported that the artificial intelligence tools provided them with visual, textual, and conceptual ideas to build more innovative and well-structured projects.

The summary results show that the integration of artificial intelligence platforms has had a statistically significant impact on all dimensions studied. Students who have used AI tools have been shown to be more motivated, more collaborative, more creative, and more skilled in using technology during project-based learning. These results are consistent with recent international studies that highlight the positive impact of AI on engagement and improving learning skills (Habibah et al., 2025; Ruiz Viruel et al., 2025; Pinheiro & Santos, 2024).

Table 2. t-test results

Category	t-value	p-value
Motivation	4.89	0.00
Cooperation	5.14	0.00
Creativity	5.82	0.00
Use of Technology	5.02	0.00

The results of the statistical analysis performed through the independent t-test (Independent Samples t-test) show statistically significant differences between the experimental group, which used artificial intelligence platforms during the development of projects, and the control group, which followed the traditional teaching process without the intervention of AI tools. These results are in line with the main hypothesis of the study, according to which the use of artificial intelligence affects the improvement of students' motivation, creativity, collaboration, and digital competencies. According to the analyzed data, a statistically significant difference was observed for all measurement categories ($p < 0.001$). Specifically, the motivation of students who used platforms such as ChatGPT and Canva AI was significantly higher ($t = 4.89$, $p < 0.001$), proving that the inclusion of intelligent tools helps students to be more involved, independent, and more interested in the learning process. Also, collaboration between students in the experimental groups was more effective ($t = 5.14$, $p < 0.001$), as AI tools enabled better task allocation, more efficient planning, and smoother communication during project implementation. In terms of creativity, the difference was more pronounced ($t = 5.82$, $p < 0.001$), indicating that students were able to produce more original ideas and more visually appealing presentations thanks to the use of content generators. Furthermore, the use of technology achieved very high results ($t = 5.02$, $p < 0.001$), indicating increased digital competence and self-confidence in the application of intelligent tools. These findings are consistent with contemporary literature (Habibah et al., 2025; Ruiz Viruel et al., 2025; Pinheiro & Santos, 2024), which emphasizes that the integration of artificial intelligence in project-based learning not only improves academic results but also promotes the development of interpersonal skills and higher cognitive thinking. In conclusion, the statistically significant results of this study indicate that the inclusion of AI platforms in the learning process constitutes an effective strategy to advance the quality of learning, helping to build a more contemporary, inclusive, and innovative environment in primary and lower secondary education in Kosovo.

Table 3Pearson correlation

	Motivation	Cooperation	Creativity	Use of Technology
Motivation	1	0.242	0.001	0.072
Cooperation	0.242	1	0.104	0.112
Creativity	0.001	0.104	1	0.074
Use of Technology	0.071	0.112	0.074	1

The results presented in Table 3 represent the Pearson correlation coefficients between the four main variables of the study: motivation, collaboration, creativity, and use of technology. As can be seen from the data, all relationships between variables are positive, although with low to moderate strength, indicating that improvement in one dimension is associated with slight increases in others, but not necessarily in a direct or strong way.

Specifically, motivation and collaboration ($r = 0.242$) show a weak positive relationship, implying that more motivated students tend to collaborate better during project completion. The relationship between collaboration and creativity ($r = 0.104$) is also positive, suggesting that teamwork can stimulate creativity, albeit to a limited extent. On the other hand, motivation and technology use ($r = 0.072$) have a very weak correlation, indicating that increased use of technological platforms does not directly affect motivation, but may have mediating effects through factors such as ease of learning or individual successes.

The correlation between technology use and creativity ($r = 0.074$) is also positive and weak, suggesting that, although artificial intelligence tools help in building ideas and presentations, creativity remains more influenced by emotional involvement and collaboration than by the technology itself. Overall, these results imply that AI integration has a moderate and interdependent impact on the components of project-based learning, creating a reciprocal relationship between motivation, collaboration, and the development of digital competencies.

This finding is consistent with contemporary literature, where researchers such as Ruiz Viruel et al. (2025) and Pinheiro & Santos (2024) emphasize that the impact of AI on the learning process is not linear, but interacts with social, emotional, and technological factors that shape the learning experience holistically. Therefore, although the correlations are statistically low, they show a positive and consistent trend that supports the transformative role of artificial intelligence platforms in the development of contemporary student skills.

Results of interviews with teachers

To complement the quantitative data and to gain a deeper understanding of teachers' and students' experiences in using artificial intelligence (AI) platforms in project-based learning (PBL), semi-structured interviews were conducted with five teachers of the *"Heronjtë e Lumës" lower secondary school* in Vermica, Prizren. Qualitative analysis was conducted using the thematic analysis method (Braun & Clarke, 2021), which enables the identification of recurring patterns and themes in the participants' narratives. The analytical process went through six stages: (1) familiarization with the data, (2) initial coding, (3) identification of themes, (4) revision of themes, (5) definition and naming of them, and (6) preparation of the final report.

Four main themes were identified from the content analysis that summarize the perceptions, benefits, and challenges of incorporating AI into project-based learning.

Table 4Thematic analysis

Main topic	Short description	Representative code / illustrative quote	Pedagogical interpretation
1. Increasing student motivation and engagement	Students showed significant increases in motivation and participation while using AI tools in projects.	"Students were more interested in discovering solutions themselves and building new ideas with the help of AI."	AI helps foster active, self-directed, and personalized learning.
2. Developing creativity and collaboration	AI helped students collaborate better and develop creative ideas for projects.	"They created original products, posters, and videos that would have previously taken them much longer."	The use of AI strengthens divergent thinking and increases collaboration in groups.
3. Changing the role of the teacher	The role of the teacher shifted from transmitter of knowledge to mentor and facilitator of the process.	"It allowed me to focus more on guidance and reflection, rather than routine explanations."	AI empowers the teacher as a guide, supporting personalized learning.
4. Ethical challenges and issues	Difficulty in managing the originality of works and a lack of technical training.	"Sometimes it's hard to tell how much of the project is the student's own thinking and how much is help from AI."	Institutional guidance and training for ethical and sustainable use of AI in education are required.

Topic 1: Increasing student motivation and engagement

All teachers reported a significant increase in student motivation and active engagement when using AI platforms. According to them, tools like *ChatGPT* and *Canva AI* have created a sense of curiosity and autonomy in students, making them more interested in researching and applying knowledge in a practical way. One teacher noted: *"Students felt freer to experiment because AI immediately gave them ideas and suggestions that they could adapt to the needs of the project."* This is consistent with Ruiz's studies, Viruel et al. (2025), and Su & Yang (2024), which claim that the use of artificial intelligence promotes self-directed learning and emotional engagement of students.

Topic 2: Developing creativity and collaborative skills

Another strong theme that emerged from the interviews was the impact of AI on developing creativity and collaboration. Teachers reported that integrating intelligent tools into projects helped students think more innovatively, combining ideas and visual resources that they had not previously explored. As one teacher put it: *"AI helped students visualize their ideas; for example, they created posters and presentations that would have taken them a lot of time before."* Collaboration between students improved as AI tools facilitated the division of labor and the coordination of ideas digitally. These findings are consistent with the findings of Habibah et al. (2025), who emphasize that AI-supported PBL helps build an active learning community.

Topic 3: Changing the role of the teacher

It was clear from the interviews that the role of the teacher is transforming from a transmitter of knowledge to a facilitator and mentor of the learning process. The teachers involved emphasized that the use of AI has enabled them to focus more on guiding students and less on routine tasks. One of them stated: *"AI does not replace the teacher, but frees him from some tedious burdens, giving him more time for individual support."* This perspective is consistent with Schiff's (2023) argument that artificial intelligence can increase pedagogical efficiency and empower the teacher as a guide to active learning.

Topic 4: Ethical challenges and issues

Although the results were generally positive, teachers reported some notable challenges in using AI platforms, including a lack of adequate training, dependence on internet connection, and ethical dilemmas around the originality of students' work. One participant noted: *"Sometimes it is difficult to distinguish how much of the project is student input and how much is AI assistance."* These concerns are in line with studies by Bosarge (2025) and Ahrofi (2025), who emphasize the need for clear policies and training on the ethical and responsible use of artificial intelligence in education.

In summary, the thematic analysis shows that the use of AI platforms in project-based learning has had a positive impact on student motivation, creativity, and collaboration, while also transforming the pedagogical roles of teachers. However, challenges related to ethical use and lack of technical preparation remain important issues that require institutional addressing. These findings support the conclusion that artificial intelligence, when used in a purposeful and pedagogical manner, can serve as an empowering tool for the development of 21st-century competencies and for the advancement of contemporary learning methodologies in basic education in Kosovo.

DISCUSSION

The results of this research provide a clear insight into the impact of integrating artificial intelligence (AI) platforms into the Project-Based Learning process (PBL) in primary and lower secondary education in Kosovo. Combined analysis of quantitative and qualitative data has shown that the inclusion of AI tools, such as ChatGPT and Canva AI, has brought about significant positive changes in students' motivation, creativity, collaboration, and use of technology. These findings support the initial hypotheses of the study and are consistent with the international literature, confirming that AI can serve as an effective tool to improve the quality of learning and support the development of 21st-century competencies (Ruiz Viruel et al., 2025; Habibah et al., 2025; Pinheiro & Santos, 2024).

The results show that the use of artificial intelligence tools has significantly increased student motivation and engagement, making them more involved in the learning process. The inclusion of platforms such as ChatGPT, which provide assistance in creating content and ideas, has significantly facilitated the learning process and increased the sense of self-confidence among students. This result is consistent with the findings of Su and Yang (2024), who emphasize that the use of AI encourages active participation through continuous interaction and immediate feedback. Teachers have also reported that students have shown more enthusiasm and persistence while working on projects, as the assistance of AI has provided them with opportunities for creative exploration and new solutions.

One of the most striking results of the study is the impact of AI on the development of creativity and collaboration among students. Through the use of generative platforms such as Canva AI, students have managed to create original and innovative products, while group work has taken on a new dimension of digital collaboration. The results of the t-test and ANOVA showed that these changes were statistically significant ($p < 0.001$), confirming that AI tools help build creative skills and manage tasks more effectively. This finding is supported by Habibah et al. (2025), who reached similar conclusions, arguing that assisted PBL significantly increases critical thinking and collaborative competencies in students.

Qualitative interview data showed a significant shift in the role of the teacher, from a traditional figure to a mentor and facilitator of the learning process. Teachers reported that the inclusion of AI has relieved them of administrative tasks and repetitive assessments, allowing them to focus more on personal guidance and pedagogical reflection. This finding is consistent with Schiff's (2023) argument that artificial intelligence does not replace the teacher, but rather empowers them to provide more effective and personalized learning. This shift constitutes an important element in the development of competency-based education, making teachers feel more involved in the strategic direction of learning.

Correlation analysis results, Pearson showed positive, albeit weak, relationships between motivation, creativity, collaboration, and technology use. These findings suggest that the impact of AI on learning is not linear, but interacts in a complex and interdependent manner with other social and emotional factors. For example, increased motivation may influence creativity through social interaction and collective involvement. This result supports Ruiz's analysis, Viruel et al. (2025), which highlights the importance of AI in creating collaborative environments that facilitate knowledge sharing and critical reflection.

Although the impacts were mostly positive, the study also highlighted significant challenges associated with the use of artificial intelligence in education. Teachers reported a lack of specialized training in the use of AI tools and uncertainty regarding the originality of students' content. These issues are related to the need for clear policies and ethical guidelines, as highlighted by Bosarge (2025) and Ahrofi (2025), who argue that the use of AI in education requires a well-defined framework for maintaining academic integrity and developing ethical digital competencies. In addition, some teachers note the dependence on technological infrastructure, which may affect the full applicability of AI-based methods.

In conclusion, this study confirms that the integration of artificial intelligence into project-based learning brings multiple pedagogical and developmental benefits. Students not only improve academic results, but also develop great collaborative and creative skills. On the other hand, teachers experience a transformation of their role, moving from a traditional figure to that of mentor and guide. However, the success of this transformation requires institutional support, systematic training, and a clear ethical framework for the use of AI in education. Thus, the inclusion of AI in PBL can be seen as an innovative model for the development of 21st-century education, which aims to prepare students for a society led by knowledge, technology, and global cooperation.

CONCLUSION

This research has examined in detail the impact of integrating artificial intelligence (AI) platforms into the Project-Based Learning process (PBL) in primary and lower secondary education in Kosovo. The combined results from quantitative and qualitative analyses clearly show that the inclusion of AI tools, such as ChatGPT and Canva AI, has brought about significant improvements in students' motivation, creativity, collaboration, and digital competencies. The study confirms the hypothesis that the use of AI platforms increases the effectiveness of learning by personalizing the learning experience and facilitating the process of creation and reflection. The findings also showed that teachers perceive the integration of AI as a transformative opportunity for their professional role, moving from transmitters of knowledge to facilitators and mentors of the learning process. On the other hand, the challenges identified are related to the lack of specific training, ethical dilemmas around the use of generated content, and the lack of sufficient technological infrastructure in some schools. These findings reinforce the need for sustainable educational policies that support the ethical and innovative use of intelligent technologies.

Overall, the research concludes that integrating AI platforms into PBL fosters 21st-century competencies, including critical thinking, problem solving, collaboration, and creativity. The study results are consistent with international trends (Habibah et al., 2025; Ruiz Viruel et al., 2025; Su & Yang, 2024) that highlight the potential of AI to improve the learning process and advance towards personalized and inclusive education.

From the data collected and the analyses performed, the following conclusions can be drawn:

- AI increases student motivation: Students who used AI tools were more engaged, more independent, and more interested in exploring new topics.
- AI improves creativity and collaborative skills: The integration of generative platforms helped students develop original ideas and work effectively in groups.
- The role of the teacher is transformed: Teachers perceive the use of AI as a facilitation of the pedagogical process and an opportunity for greater focus on mentoring and reflection.
- The use of AI requires institutional support: The success of integration depends on technological infrastructure, staff training, and ethical policies for its use.
- AI interdependently impacts the learning process: Positive links between motivation, collaboration, and creativity indicate a mutual effect of social, emotional, and technological factors on the learning process.

RECOMMENDATIONS

Based on the results of the study, the following actions are recommended for stakeholders in the field of education:

a) For educational institutions

- Develop institutional strategies for integrating AI into the school curriculum and project-based learning.
- Provide technological infrastructure and stable internet in every school to enable the use of intelligent platforms.
- Create training centers for teachers, where they can learn the practical and ethical use of AI tools.

b) For teachers

- Adopt reflective approaches and utilize AI for personalization of learning and formative assessment.
- Interdisciplinary projects that connect traditional subjects with technology and creative thinking.
- Use AI as a supportive tool, not a substitute for students' critical and creative thinking.

c) On educational policies and professional development

- The Ministry of Education should develop ethical and legal guidelines for the use of AI in education, including issues of privacy and academic integrity.
- Include AI in teachers' digital competency standards and professional development programs.
- Encourage collaboration between universities and schools for further research on the impact of AI on learning.

Implications for educational practice

The results of this research have important practical implications for the education system in Kosovo. The integration of AI platforms into PBL can serve as a catalyst for the digital transformation of schools, supporting a personalized and sustainable approach to learning. The use of AI can become an integral part of the curriculum, helping to prepare students for the future labor market and for the development of skills such as critical thinking, creative problem solving, and interdisciplinary collaboration. These results are consistent with the recommendations of OECD (2023), which emphasizes that educational transformation through AI should be comprehensive and supported by continuous training for teachers.

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